Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington, DC 20554

In the Matter of	)	ET-Docket No. 93-62
Guidelines for Evaluating the Environmental	)	and FCC Report and Order FCC 96-326
Effects of Radiofrequency Radiation	)	

To: The Commission

PETITION FOR RECONSIDERATION

Regarding FCC Report and Order FCC 96-326 Adopted and Released August 1, 1996

Submitted by the Ad-hoc Association of Parties Concerned About the Federal Communications Commission's Radiofrequency Health and Safety Rules
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and submitted by other parties listed in Exhibit 1

September 6, 1996

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SUMMARY

Perhaps due to misunderstanding, overlooked and new information, it is respectfully noted Final Rule FCC 96-326 regarding ET Docket 93-62, needs modifying to meet significant public health and safety concerns and directly affecting some petitioners. 47 CFR Part 1 §1.1307 (significant actions) and 47 CFR Part 1 §1.1310 (exposure criteria) need modifying.

A. Modifications needed in §1.1307 (actions with significant environmental impact):

(1) Modify §1.1307(b)(1) to consider lowest height transmitters, and adding section (1)(i) for distance between buildings and transmitters will help prevent out-of-compliance conditions allowed by exemption criteria; adding new sections(b)(1)(ii, iii, iv, v) for **(ii)** notifying those affected (workers, the public, local jurisdictions, potential lessors) of the evaluation and providing them information on radiofrequency biological, health and safety effects; **(iii)** specifying measurement guidelines (a) using SAR predictions,(b) including predictions be reasonable worst case conditions (e.g. corner reflections, wearing of metal eye-glass frames), other measurement parameters, **(iv)** using independent evaluations when indicated, and **(v)** clarifying local authorities obtain data to assure exposure and other safety concerns are met.

(2) Modifying §1.1307(b)(4) action criteria during the transitional period for Personal Communications Services (PCS) is needed because the Commission has erroneously adopted in its entirety a standard some of whose elements (i) are facially inconsistent with the principles adopted by and findings noted by the Commission; (ii) permit exposures out-of-compliance with previous Commission standards and those to be adopted; (iii) include criteria irrelevant to PCS frequencies, and (iv) violate basic protections, make unwarranted claims, or otherwise are inappropriate, may harm the petitioners, and may set an unnecessary precedent whereby future standards may include these harmful elements. Thus, it is requested only Table 2A limits of this standard that enhance protections should be permitted to replace previous criteria for this period.

(3) Clarifying §1.1307(e) is needed since the Commission's decision concerning pre-emption is impermissibly vague and ambiguous and should be clarified, noting full pre-emption of personal wireless services regulation is not intended. Thus, state in a section §1.1307(e)(5), "This rule only preempts the regulation of the *'placement, construction and modification'* of personal wireless

facilities on the basis of environmental effects of radiofrequency emissions, and not for other reasons (visual, safety), and not the zoning of, operation of, or exposure from such facilities, nor prevent the collection of fees or taxes to fund studying health effects from these facilities."

B. Modifications needed in §1.1310 (Radiofrequency radiation exposure limits):

(4) Reducing Table 1 exposure limits to 40% of current levels is needed to avoid exceeding current whole body absorption rates of energy upon which field exposure criteria are based.

(5) Insofar as §1.1310 fails to state criteria rationale, address mixed frequencies, explicitly limit energy absorbed, and note problematic issues, let the 1986 National Council for Radiation Protection and Measurement (NCRP) standard parts 17.1, 17.2, 17.3, 17.4.6, 17.6, 17.6.1, 17.6.2 apply, as well as apply §2.1093 (d)(1) and (d)(2) to fixed transmitter sites.

(6) The Commission cannot reconcile its reasoning and conclusions to the actual studies in the standards to which it refers, and based on varying evidence strength, some exposure limits should be reduced to no more than 25% to 0.01% of current limits, at least for personal wireless services for which this is most important and feasible. This reduction is due to evidence that below the hazard threshold upon which current exposure criteria are based there occurred (i) adverse health effects (e.g. cancer, reduced learning and skill performance, nervous system pathology, fetal anomalies) and biological effects of concern (sleep abnormalities, abnormal blood characteristics, cell calcium efflux, perceived noise); (ii) permitted electrical fields adversely affect (a) RF burns, shock, high induced currents, and (b) sensitive medical equipment in the home or medical facility.

(7) Protection should be stated in §1.1310 and in informational material, and to include health agency evaluations and observed adverse effects below the hazard threshold upon which adopted criteria are based. Commission statements that criteria are believed safe seem unwarranted.

(8) Some worker protections are vague or lacking. Accordingly, in Table 1A the Occupational Safety and Health Administration elements of a worker safety program should apply as well as the restrictions when there is modulation as given in NCRP (1986) section 17.4.5.

(9) State, *"exposures should be kept as low as reasonably achievable,"* and specify, especially for personal wireless services, those granting use permits seek alternatives to reduce exposure.

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To: The Commission

PETITION FOR RECONSIDERATION

The Ad-hoc Association of Parties Concerned About the Federal Communications Commission's Radiofrequency Health and Safety Rules ("the Association") and other parties listed in Exhibit 1 which are parties subscribing to this petition hereby submit this Petition for Reconsideration of the Commission's Report and Order FCC 96-326 ("R&O") issued in the above docket with public notice published in the Federal Register on August 7, 1996 Vol.61, No. 153, page 41006-41019. This petition is being timely filed pursuant to 47 Code of Federal Regulations Part 1 §1.4(b)(1) and §1.429. Some members of the Association are documented in Exhibit 2.

1. Procedural considerations: Perhaps due to misunderstanding, overlooked or new information, it is respectfully noted that the Report and Order FCC 96-326 regarding ET Docket 93-62, needs modifying to meet significant public health and safety concerns directly affecting some petitioners. For the most part, this Petition For Reconsideration is based upon failure of the Commission to properly assess information available to the Commission in the record or referenced therein. To the extent this petition relies on findings that were not previously presented to the Commission, these facts and reports became publicly available after the last opportunity for filing in this matter, and in any event, consideration of these facts significantly relates to changes needed for the public health and safety and is in the public interest. The Code of Federal Regulations ("CFR") 47 Part 1 §1.1307 (significant actions) and 47 CFR Part 1 §1.1310 (exposure criteria) need modifying. Should the Commission find it appropriate to modify

other sections of 47 CFR to implement the intent of the proposed solutions, it is requested that it do so, and make any other modifications it finds to be just and proper.

2. Introduction: Current limits neither reflect current science nor reflect prudence. The Commission is requested (1) to assure interested parties are aware of a facility application to the Commission and are knowledgeable of its potential environmental impact; (2) to base criteria upon (i) scientific knowledge referenced in ET Docket 93-62 and new evidence and upon (ii) a public health approach requiring prudence[47] to protect the health of petitioners and the public health which may be significantly adversely affected; (3) given uncertainties, to set more strict limits; and (4) to be diligent when receiving scientific testimony as there is evidence that radiofrequency (RF) users and those who consult for them have sometimes let scientific and public health policy judgments be affected by other considerations. If future evidence shows limits are too strict, they can be lifted. This is the prudent course to protect the public interest.

3. Petitioners are directly affected: Among those subscribing to this Petition for Reconsideration are petitioners who are directly affected by the Commission final rule. These include the Association some of whose members (i) either live in the immediate area by a transmitter under Commission authority or (ii) whose children attend a school with such facilities or (iii) whose children attend a school for which a permit has been issued to build such a facility; and similarly (i),(ii), or (iii) apply to some other parties subscribing to this petition. Others subscribing to this petition are exposed to RF as a concomitant of employment and will be directly affected by the Commission rules. Those subscribing who represent members directly affected include, but are not limited to (1) Communication Workers of America State of Washington Local 7810 which has members, including President Bill Jenkins, who service wireless transmitters, (2) the Cellular Phone Task Force of Brooklyn, New York which has members living in buildings with personal wireless facilities, and (3) Parents For the Elimination of the Schoolyard Tower in Laguna Beach, California whose members have children attending a school with wireless transmitters; all these are representing their members' interests. See Exhibit 1 for documentation of those subscribing to this petition and Exhibit 2 for some members of the Association and how those they represent are directly affected by the Commission's rule and by this petition's requests.

4. New information is pertinent and may have a greater impact on children: There is new information pertinent to this proceeding which was not available since the last opportunity to file in this matter. These data further support evidence that there may be potentially adverse health effects at exposure conditions permitted by the Commission's final rule and that therefore it is in the public interest to modify such rules. Specifically:

(4.1) Microwave News May/June 1996 reported[1,2] that at 900 MHz, near cellular phone frequencies, an exposure of 50 microwatts per square centimeter ($\mu W/cm^2$), 1/12th of the Commission's permitted limit at this frequency, resulted in an 18% reduction in REM sleep of adults[2]. REM sleep is important for memory and learning functions[2]. This may especially affect infants since (1) they sleep much during the day and early evening when power density levels are highest, (2) sleep long hours so the total REM sleep loss could be greater than for adults, (3) their memory and learning are rapidly developing, and (4) their head diameter is closer than adults to the optimal 25%[67] of the incoming 13 inch cellular phone or 6 inch PCS wavelengths.

4.2 (1) In June 1996, a study was published demonstrating that a therapeutic RF procedure to treat insomniacs in which only the head is exposed to 27 MHz amplitude modulated RF reported significant improvements in start and length of certain sleep stages[1,3] and at specific absorption rates (SAR) of RF power to the head 1/16th (0.1 W/kg) of the Commission's partial body 1.6 W/kg limit for the public in §2.1093(d)(2) of its rule. Further, this study is a replication of a 1994 study in Denver[4] that reported similar results. Also (2) A May 1996 study[5] for exposure as 4.2(1), reported brain EEGs supporting the results in 4.2 (1). While these exposures show improved sleep in an appropriate setting, at these or higher levels they may inadvertently in an occupational or school setting cause drowsiness and adversely affect learning, work performance, and safety.

4.3 For 2450 MHz amplitude modulated at 50 Hz with exposure levels of 100 $\mu W/cm^2$ (average SAR is 0.14 W/kg which is 33% of the 0.4 W/kg deemed 'safe' for workers[100,102,103,104] and 3.5% of the 4 W/kg hazard threshold upon which Commission exposure limits are based[100]), a July 1996 study[6] reported the immune system increased antibody production more than for continuous waves. A 1991 study similarly reports at 30 $\mu W/cm^2$ there was *"moderate elevation*

of PFC count (antibody producing cells) with non-pulsed microwaves and a marked elevation in the case of amplitude modulated microwaves at specific modulation frequencies."[14] Authors of the July 1996 article note relevance to mobile telecommunications, *"because of the ELF (extremely low frequency) modulation frequency and field intensity."*[6]

4.4 A July 1996 review showed how from a theoretical perspective magnetite in human cells can provide a mechanism for coupling nonthermal levels of radiation to biological systems[7].

4.5 At the June 9-14, 1996 Bioelectromagnetics Society Meeting, it was reported for rats exposed to about 836 MHz at 0.58 to 0.75 W/kg (18.75% of the 4 W/kg hazard threshold upon which are based Commission exposure limits) there was a biological effect of the development of brain tumors[97], where in this case, there was a reduced incidence of tumors, and *"Tumors of exposed rats were smaller in volume."*[97] and was reported siignificant[105]. Since it has been shown for some frequencies that only a 30 MHz spectrum shift can cause growth rates of some cells to change from 29% less than expected to 15% greater than expected[106] and other studies show frequency dependences[108,109] including of low dose (1 $\mu W/cm^2$) microwaves on the ability of chromosomes stressed from their normal shape to repair themselves[107]. Thus, since an effect was demonstrated, it is possible that for other telecommunication frequencies or transmission patterns there may be an adverse effect. Also FDA reports that the data that exist *strongly suggests that microwaves can, at least under some conditions, accelerate the development of malignant tumors."*[48] Thus, these recent studies document and provide significant new support which, with other studies, demonstrates significant health effects at low exposure levels.

5. Considering views of health agencies: The Commission should ask the federal health agencies to evaluate requested exposure criteria modifications, as this is in accordance with its policy on health and safety matters, which is the correct policy, that *"it would prefer to defer to the expert federal health and safety agencies for guidance in this area,"*[15] and which it reaffirmed in the R&O (sec. #28). Furthermore, from a perspective of public health, ask, *"How likely is it that some people could suffer health damage if we do not take action today,"*[47] and

set more strict limits? Since uncertainty is acknowledged, asking whether scientific evidence is conclusive is not the relevant issue.

Evidence for caution when evaluating responses to this petition: RF users and consultants to users have been reported to suppress information[12] or provide incomplete information, mis-information, that is "a total fabrication"[10], or judgments contrary to policies of the US Environmental Protection Agency ("EPA") and some standards (IEEE 1991) were developed with lack of scientific rigor[11,13]. Also the development process of IEEE had serious flaws Develop flaws include (a) super-majorities needed to modify minority views[112]; (b) 2 of the 3 balloting committee members from federal health agencies who voted to reject IEEE 1991 gave the reasons: (i) *"not balanced in representing government, industry, and the general public,"* (ii) lacked *"agency review and comment"* of a draft, (iii) had *"very weak justifications"* for exposure increases (iv) *"brushed aside"* important papers showing *"pulsed microwaves may give responses at lower average levels than continuous waves."*[13,19] Hence, caution and diligence are needed.'

A. Modifications needed in §1.1307 (actions with significant environmental impact):

7. Modifying categorical exclusions in §1.1307(b)(1) to consider lowest transmitter and distance between buildings: (1) In §1.1307(b)(1) Table 1 replace "radiation center" with "height of the lowest transmitter." This is because now an evaluation is required of a single1100 watt effective radiated power (ERP) cellular transmitter 8 meters high, because it has over 1000 Watt ERP and is less than 10 meters. But if the same transmitter were part of an antenna system with similar transmitters at 8, 11, and 14 meters, then the radiation center would be above the 10 meter limit and a routine evaluation would not be required. (2) Also, a low height single transmitter[23,24,25,44] just above 10 meters may have sufficient power so out-of-compliance exposure occurs at nearby buildings (e.g. exposure due to a transmitter 35 to 45 feet high with 3000 watts ERP (which occurs[25]) of a building 43 feet away would exceed limits, but now no routine evaluation is required. Likewise, low height transmitters may be independently sited, but be close enough to an upper floor apartment or office near the same height as the transmitters so as to receive the typically horizontal main beam and excessive exposure; e.g. if each of 4 cellular omnidirectional transmitters just above10 meters had 2500 watt ERP and each was at a corner of

a city block 100 feet on a side, an apartment of the same height at the center of the block would get 186 $\mu W/cm^2$ from each transmitter, and the total 744 $\mu W/cm^2$ exceeds limits. To prevent improper categorical exclusions, add a new section §1.1307(b)(1)(i) which states, "When assessing exposure the applicant must demonstrate that each area within 1000 meters of a facially will not be out-of-compliance due to exposure from the facility and other RF source within 1000 meters from each area. A sufficient demonstration would be to use NCRP 17.4.6 and Commission instructions[15] to sum the exposure impact of all transmitters within 1000 meters assuming they are the same height as a building on the nearest next property where a building is (or may be) built. If the weighted power density exceeds 0.5 then require a detailed evaluation;

8. Notifying those affected: To assure proper input from interested persons per §1.1307(c) the EPA recommended NCRP 1986 standard requiring *'fully informing the worker and the public of the limits of knowledge'* (NCRP 17.3) should be in the Commission final rule and implemented in a new section §1.1307(b)(1)(ii) stating, *"(1) Prior to filing an application for Commission action all applicants shall provide and document in their application providing Commission required informational material to residents, schools, and hospitals within 1000 meters of a facility, the local jurisdiction, and those expected to be exposed to a site as a concomitant of employment (and any organization representing those so employed), and potential lessors."* Indications of concern are that the California Public Utilities Commission[29] recommended transmitters not be placed near schools or hospitals, and neither the San Francisco School District[30], nor some other school districts[91], nor the Ministry of Education in New Zealand[31,32] allow new leases. Also state, *"(2)(i) The local jurisdiction, schools, hospitals, and representatives of employees exposed as a concomitant of employment should receive (a) how to reference the application to the Commission, (b) if there is an environmental assessment (c) Commission required informational material (see paragraph #12) and (d) how to request from the applicant, without charge, a copy of environmental assessments, documentation that an appropriate RF safety program exists for any applicable 'occupational/controlled' environment, and other application sections open to the public. (2)(ii) A notice including (a),(b), and to get more information should be posted at the relevant site in a manner used by the local jurisdiction. Potential lessors of property for*

facilities shall be given information in (c) before signing a lease to meet the requirement in NCRP 1986 17.3 noted above. Also, before the signing of a lease those named in (2)(i) and (2)(ii) should be invited to a public meeting to give and receive information per NCRP 17.3 and to indicate alternatives to the proposed action which may help keep exposures 'as low as reasonably achievable' ('ALARA')." The ALARA policy will be shown to be the appropriate prudent Commission policy to best serve the public interest.

9. Documenting providing required Commission informational material on radiofrequency biological, health, and safety effects, and electrical interference effects. Add to §1.1307(b)(1)(ii) above stating, *"States and local jurisdictions may require review of non-Commission materials provided by operators to parties in paragraph #9 above to assure up-to-date information. Commission information with shall include articles on RF health, safety, biological, electrical interference and other environmental effects, and, since there is controversy, 'the limits of knowledge' will include sections in the information providing the differing perspectives of federal, state, and local jurisdictions, public health, education groups, professional telecommunications associations, industry organizations, citizen groups concerned about RF environmental effects, labor organizations, and civic groups of general interest. Common carriers shall duplicate and provide Commission materials. The initial studies to be included shall be those identified on page 34 of the 1995 General Accounting Office report related to the safety of cellular telephones[36], those studies identified by EPA, and those referenced in this petition."*

10. Parameters to be reported and measurement guidelines: The basic local body exposure protections should not be violated. State in §1.1307(b)(iii) *"If exposure predictions from fixed location transmitters indicate the SARs exceed those in Part 2 §2.1093(d)(1) or (2) as appropriate, then an evaluation assessment is required, for these basic provisions shall be met."* Also to be prudent and to protect the public interest state, *"Exposure predictions shall be based upon reasonable 'worst case' conditions and shall include possible passive or secondary corner reradiation of signals received from a transmitter or reflected from ground[46]. This can increase power density 16 to 20 fold, and should include power density exposure from common wire loop*

or linear reradiators for pertinent frequencies. Personal wireless service operators should report the power density and estimated SAR for the eye and consider effects of commonly worn metal eye-glass frames where there may be re-radiated towards the eye up to a 10 fold increase in the electric field (100 fold increase in power density)[45]*."* While some experts may find weaknesses in these predictions[45] and how they may affect eye SAR[78,79], studies finding indications at adverse effects were noted by EPA[20] and FDA[50] at eye SAR of 0.26 W/kg[79]. Hence, the public interest requires available prediction methods be used until better ones are developed. Also state. *"Report antenna model, height of each antenna, distance from buildings, modulation pattern, (and if pattern meets NCRP 4.6.7 criteria), and power density for the frequency band of each operator at least 4 equidistant points each at distances of 20, 50, 100, 300, and 1000 meters from a site to monitor overlapping exposure patterns;"* others recommend similar measurements, see Exhibit 3.

11. Independent evaluations: Add §1.1307(b)(1)(iv) stating, *"When the Commission finds an operator is not properly providing information, and particularly upon reasonable evidence provided by a local jurisdiction, the Commission may require an operator to use organizations from a list of those approved by the Commission and local jurisdiction to make independent evaluation assessments which shall be included with an operator's application."* This helps assure confidence by the public in assessments and thus significantly serves the public interest.

12. Acknowledging local jurisdiction authority for additional measurements and encouraging such measurements: Add §1.1307(b)(1)(v) stating, *"It is acknowledged local jurisdictions have authority to require further measurements of exposure by operators for health and safety purposes, e.g. so at least local jurisdictions may notify likely affected persons, hospitals, or certain businesses of possible electrical interference to sensitive electronic medical devices and other items."* This is prudent since U.S.General Accounting Office[36], EPA reports[70,71,72,20], a science series of the North Atlantic Treaty Organization[38], IEEE 1991 Final List papers[42,57,73], NCRP[68], and other papers[43,74] find important biological effects, some suggestive of detrimental effects, at non-thermal pulsed or amplitude modulation specific

[redacted]

to 1000 MHz) at 1 to 3 Volts/meter[75,76] ("V/m") (0.26 to 2.44 $\mu W/cm^2$), hearing aids interference becomes annoying at 4 V/m[77] (4.24 $\mu W/cm^2$), and telephones[75] may be affected. Thus, prudence requires that in the public interest the Commission acknowledge local jurisdiction authority to require measurements of operators for jurisdictions to make notifications monitoring.

13. Modify transitional criteria in §1.1307(b)(4), which are only applicable to PCS services, so they are consistent with other Commission decisions, federal health agency guidelines, and the public interest: Some criteria in 1.1307(b)(4)(ii) relevant to PCS services are less protective of the public health than both previous or new Commission standards and should not apply, and other criteria are both irrelevant to PCS frequencies and flawed. - such criteria should not receive sanction by the Commission. To solve these problems modify §1.1307(b)(4)(i) so that the Commission decision *"that our existing RF guidelines will continue to apply to station applications,"*(R&O #112) is implemented, except when the Commission in its final rule has chosen Personal Communication Services (Part 24) exposure criteria, in some cases, to be subject to more restrictive, then for such cases, the more restrictive criteria should apply. To accomplish this, include in the list of applicable parts in §1.1310(b)(4)(i), "Part 24", and after "*New York shall apply,*" add, *"except that for such facilities and operations under part 24, when exposure criteria in ANSI C95.1-1982 would permit a condition, but limit values corresponding to those in IEEE C95.1-1991 ("IEEE 1991") sections 4.1.2 Table 2A, 4.2.1 and 4.2.2 (excluding 4.2.1(b) and 4.2.2(b)) would not permit a condition, then the limiting values corresponding to those in IEEE 1991 shall apply." Section 4.2.1 applies to persons meeting criteria in Note 1 of Table 1 of §1.1310 and 4.1.2 Table 2A and 4.2.2 apply to persons meeting criteria in Note 2 of Table 1 of §1.1310."* Eliminate §1.1310(b)(4)(ii). Require to re-license any applicants licensed under IEEE 1991; if a review of the documentation in the record shows proposed criteria are met, then a re-licensing can occur administratively without a formal re-application being required. By doing the above, persons who are 'general population/uncontrolled' will receive less exposure for frequencies under 7500 MHz, and allowing exclusions will be as strict as under the new rules.

14. Transition criteria elements not in the Commission's previous or new rules, and which are not in the public interest to apply (if relevant to PCS) or sanction

14.1 Definition and Rationale sections: These should not be sanctioned because limits are claimed "safe for all" [IEEE 1991 pg. 23], yet EPA[20], NIOSH[49], and FDA objected.[50]

14.2 Claims IEEE 1991 limits are 'safe for all' are inconsistent with some of its Final List of Papers Reviewed for IEEE 1991. 91 ("Final List"): IEEE 1991 states of papers reviewed for [illegible] questionable statistical methods were evaluated further..." [IEEE 1991 pg. 27]. IEEE 1991 also states, *"most sensitive measures were based on disruption of ongoing behavior.."*[pg 27], *"disruption of a highly demanding operant task is between 3.2 and 8.4 W/kg* "(including for rodents [pg. 27], and, because the behavior disruption threshold in nonhuman primates was between 3.2 to 4 W/kg, based on 4 referenced studies [pg. 28], 4 W/kg was adopted as a working threshold [p.28]. For frequencies where SAR is meaningful (.1 to 6000 MHz [IEEE 1991 pg. 22]:

14.2.1 3.2 W/kg or less should be the threshold, since IEEE 1991 state studies found thresholds at this level. Applying statistical methods for estimating lower tolerance limits[81,82] to the 4 studies used by IEEE 1991 would have given lower (more protective) limits.

14.3 Studies in the IEEE Final List with adverse effects at exposure below 4 W/kg

Behavioral disruption:

14.3.1 At 2.3 W/kg:(58%): *"The observed decrement in discriminative performance emerged immediately upon initiation of MW radiation."* (Mitchell et al, 1977)[83]

14.3.2 At an average of 2 W/kg (50%) "marked decrements of responding occurred" when animals were exposed at 28 Deg. C (82 Deg. F) (Gage et al., 1979).[98]

14.3.3 At an average of 1.6 W/kg (40%) "The results of our experiment show that intensity of microwave irradiation and ambient temperature interact to increase decrements in rates of behavioral responding measured at termination of irradiation." (Gage et al. 1982)[99]

14.3.4 At 1.2 W/kg (30%) *"The rat's ability to discriminate the appropriate (time interval to wait to get a food pellet) was disrupted...Results of the present study indicate, that at the same field strength, a PW (pulsed wave) field is more likely than a CW (continuous wave) field to affect temporal discrimination."*(Thomas et al. 1982)[84]

14.3.5 At 0.7 W/kg (18%) "Error responding was increased during most of the session. Produced alterations in 50% of the test sessions (learning a 4 step sequence of tasks) (Schrot et al, 1980)[85]

14.3.6 At 0.2 W/kg (rough approximation) (5%) Rats were given doses of dextroamphetimine used to treat Attention Deficit Disorder in children[86], adolescents[86] and adults[87]. *"The response rates were notably higher* (too many responses) *after microwave radiation.. even though the last exposure to radiation occurred 24 hours before the drug was administered,"* suggesting a cumulative effect of the irradiation. (Thomas et al, 1979)

Adverse effects (non-behavior) at exposures below 4 W/kg

14.3.7 At 2 to 3 W/kg (50% to 75%) Cancer acceleration: Injecting sarcoma cells in mice gave an average of 69% more sarcoma lung nodules in3 months of RF exposure. (Szmigielski, 1982)[89]

14.3.8 At 2 to 3 W/kg (50% to 75%) Cancer acceleration: Placing skin carcinogen on mice already RF exposed 3 months resulted after 6 more months in 22 of 40 exposed mice having tumors, and 0 of 40 control mice with the skin carcinogen having tumors. (Szmigielski, 1982)[89]

14.3.9 At 2 to 3 W/kg (50% to 75%) Cancer acceleration: The midpoint for days of survival of breast tumor prone RF exposed mice was 20% less due to the exposure. (Szmigielski, 1982)[89]

14.3.10 At 2.3 W/kg (58%) The only difference was *".the mean frequency of such structural anomalies* (myelin figures in cortical dendrite nerve cells) *was approximately 3 times greater in irradiated as compared with nonirradiated tissue."* (Switzer, 1977)91 The affected animals were those in 14.4.1. Thus, anomalies of the cortex were associated with a behavioral disruption.

14.3.11 At 2 W/kg (50%) Fetal anomalies: *"The high rate of occurrence of cranioschisis (incomplete cranial development) seen in the irradiated fetuses and the consistency in which cranioschisis appeared in irradiated fetuses only is strongly suggestive that the application of microwaves was the cause..*(Berman, 1978)[92]

Exposures with adverse effects that are below exposures reporting behavioral disruption:

14.3.12 At 0.01 W/kg[93] (0.25%) *(30 $\mu W/cm^2$)* Indications of breaching of the blood brain barrier.*"...complete functional loss of the tight junctions ...would result in cerebral edema, in increased pressure, and in irreversible brain damage..Perhaps it is coincidental, but the*

repetition rate of 5 pulses per second falls within the spectrum of intrinsic electrical rhythms of the brain." [NCRP, 1986] on (Oscar, 1977)[94]. No artifacts from temperature due to low power.

14.3.13 At 0.006 W/kg (approx.) (0.15%) Male rats at 2380 MHz (12.6 cm wave length) were exposed to power densities of 1000, 50, 25 and 10 $\mu W/cm^2$. *"Thus, it was determined that long-term exposure to NMR (nonionizing microwave radiation) with intensity of 1000 to 10 $\mu W/cm^2$ (3 times a day 40 minutes at a time, for 2 months) elicits changes in the ultrastructure of the hippocampus (of the brain)...The demonstrated changes can most probably effect their function and constitutes one of the elements of pathogenesis of early disturbances in people exposed to this environmental factor."* (Belokrinitskiy, 1982)[95]

IEEE Final List studies/references indicating the 10 mW/cm^2 power density at upper frequencies is too high - for studies below all frequencies were greater than 15 GHz

14.3.14 At 8.3 mW/cm^2 people are expected to feel 'very warm to hot' (Gandhi et al, 1986)[113]

14.3.15 At 1.7 mW/cm^2 on an arm people perceive warmth within 10 seconds. Longer or shorter durations of exposure ..are often associated with lower or higher thresholds.[114]

14.3.16 The ANSI Z136.1-1993 "Safe Use of Lasers" standard states that its limits, which include 10mW/cm^2 for 300 GHz *"may be uncomfortable to view or feel upon the skin....maintain exposure levels as far below the (limit values) as is practicable."*[115]

14.3.17 At 17 mW/cm^2 there was "muscular flaccidity or collapse (of chicks). At 20 mW/cm^2 there was mild hyperpyrexia below the frontal portion of a rat's skull. (10 mW/cm2 of IEEE 1991 has a safety factor, if any, of less than 2 which is quite unusual[96]). (Deichman et al. 1959)[116]

14.3.18 At 10 mW/cm2 "induced significant leucocytosis, lymphocytosis, and neutrophilia ...Effects on erythrocytes, hemoglobin, and hematocrit differed in the three strains.[117]

14.3.19 IEEE 1991 reference [B26] recommended 1 mW/cm^2 for the general population.[64].

14.4 Magnetic field error states average SARs due to the less restrictive magnetic field limits for "uncontrolled" environments are less than 5% of 0.08 W/kg[118]. But at 0.1 MHz, SAR is 0.014 W/kg and at 3 MHz, SAR is 0.011[64] W/kg; these are 17.5% and 13.75%, respectively of 0.08 W/kg - 2.5 fold more than 5%. Moreover, these higher SARs are significant because as seen above adverse health effects in Final List papers occurred near or below these levels.

14.5 "Controlled" and "Uncontrolled" are concepts in IEEE 1991 of which EPA said "we strongly disagree"[20], were "problematic" for NIOSH[49], with implications "unacceptable" to OSHA[37], and were rejected by the Commission.(R&O #42). To adopt them for the transition period is against the record, contrary to past decisions and policy and not in the public interest.

14.8 Power density limits for PCS for the less restrictive tier in IEEE 1991 should not be adopted and may violate basic protections for workers and children. (1) Children in places of "transient passage" e.g. bus stops, may be exposed at the higher levels of this tier, and a maximum exposure of 6.63 mW/cm2 at 1990 MHz exceeds the 5 mW/sq. cm. of both previous and new limits, and EPA objected "is not an improvement."[20]. (2) For a 1 year old this results in an average SAR of 0.46 W/kg which violates the basic 0.4 W/kg protection of this standard. (3) Recent dosimetry studies of Gandhi et al[52] indicate for an average man average SAR approximately constant above 350 MHz at 0.08 W/kg at 1mW/cm^2. For PCS, an average man would absorb 0.53 (6.63 x 0.08)W/kg, exceeding 0.4 W/kg, violating a basic protection provision.

14.9 Relaxation of Limits of Partial Body Exposure problems: (1) At 300 GHz allows 40 mW/cm^2 for workers and 20mW/cm^2 for the public, both limits violating the Safe For Laser[115] partial body exposure of 10 mW/cm^2 with which IEEE 1991 seeks compatibility. At lower frequencies are also violations, e.g. using data from Gandhi[52] 1mW/cm^2 from a cellular signal on the chest from a distant source results in about 0.8 W/kg for some tissue; hence an IEEE 1991 permitted 4mW/cm^2 from a RF device by the chest will result in about 3.2 W/kg, violating the basic protection provision of no more than 1.6 W/kg in a partial body region.

14.10 Conclusion: Only IEEE 1991 limits recommended in #13 above should be adopted. Many other elements are contrary to federal health agency advice, contrary to Commission decisions, violate basic protections, include unwarranted claims or are otherwise not in the public interest.

15. Clarifying Commission pre-emption authority: The Commission states the new telecommunications act provides for *"federal preemption of state and local regulation of personal wireless services facilities on the basis of RF environmental effects."*(R&O #166). This may be misunderstood. Thus, state in a section §1.1307(e)(5), "This rule only preempts the regulation of the *'placement, construction and modification'* of personal wireless facilities on the

basis of environmental effects of radiofrequency emissions, and not for other reasons (visual, safety), and not the zoning of, operation of, or exposure from such facilities, nor prevents the collection of fees or taxes to fund studying health effects from these facilities."

B. Modifications needed in Part 1 §1.1310 Radio frequency radiation exposure limits

Recently, Gandhi et al(1992)[52] used a computational method called Finite-Difference Time-Domain (FDTD) which the Commission found valid (R&O #70). Gandhi et al.[52] report above 350 MHz the average SAR for an average man is approximately constant at 0.08 W/kg at 1 mW/cm^2, see below.

For "E" position:	MHz: 350	500	700	915
1. Average SAR Isolated man	0.0804	0.0846	0.0842	0.0825 W/kg
2. Avg SAR of 1 year old (est.)	0.0804	0.0846	0.0842	0.0825 W/kg

To roughly approximate the SAR of a 1 year old to be found using the FDTD method one can find the SAR ratio of a 1 year old to an average man and apply it to the SAR of the average man found by Gandhi. For the above frequencies the ratio is about 2.5; so for the average SAR of a 1 year old to be under 0.08 W/kg, the power density limits must decrease to 40% of their current value for above 350 MHz. Thus, power density limits of cellular and PCS frequencies would be near 580x.4 = 232 $\mu W/cm^2$ and PCS power 493 $\mu W/cm^2$ to provide present SAR protections.

17. At frequencies above 6000 MHz limits should be no more than 0.4 mW/cm^2 because at 0.84 mW/cm2 a sample of human subjects experienced a 'marked sense of warmth'[113] from infrared exposure while nude. Since RF can pass through clothes, clothes can cause a "greenhouse effect"[113], and given some people are heat sensitive[20,72] Moreover, since Deichman[117] found adverse effects at 10 mW/cm^2 (see 14.3.18) dividing by 2.5 to estimate a 'threshold' and then by 10 to obtain an exposure limit is reasonable. Yet further reductions are needed.

18. Insofar as §1.1310 fails to state criteria rationale, address mixed frequencies, explicitly limit energy absorbed, and note problematic issues, let the 1986 National Council for Radiation Protection and Measurement (NCRP) standard parts 17.1, 17.2, 17.3, 17.4.6, 17.6, 17.6.1, 17.6.2 apply, since EPA has recommended this standard and the Commission has said it defers to EPA.

Since power density is to assure basic protections, let the Commission explicitly state basic protections in §2.1093 (d)(1) and (d)(2) apply also to fixed transmitter sites.

19. The Commission cannot reconcile its reasoning and conclusions to the actual studies in the IEEE 1991 standard to which it refers. #14.3 reports adverse effects below the hazard threshold upon which are based Commission limits, and also occur below exposure limits, e.g. 14.3.13. Since Gandhi shows SAR for the brain and eye increase as frequency increases from 350 to 915 MHz no direct SAR by power density relationship will be regularly applied; should SARs be needed please see the reference. When setting protection limits, threshold values are divided by 'uncertainty' or 'safety' factors which are typically in the range from 10 to 1000, with a traditional value of 100[96].

19.1 0.05 $\mu W/cm^2$: Since adverse effects at about 0.006 W/kg are reported in 14.3.13 IEEE Final List paper, set a hazard threshold at about 1/7th of this, 0.0008 and general population protection limit using a traditional 'uncertainty factor' of 100 to get an average SAR = 0.000008 W/kg. So for cellular frequencies the limit would be about 1/10,000th of current limits or 0.05 $\mu W/cm^2$. Other justifications include immune system effect at 30 $\mu W/cm^2$ reported in #4.3[14], impaired nervous system activity at 5 to 20 $\mu W/cm^2$.[122], changed ovulation cycles in chickes[123] at 0.0004 $\mu W/cm^2$ for which the authors speculate was due to stimulation of the pituitary gland, at 0.00011 W/kg there was fetal loss and fetal abnormal development[124], at 1 $\mu W/cm^2$ and at 41.32 GHz suppression of effectiveness of radiation induced repair of the genome conformal state[107], at 0.2 to 8 $\mu W/cm^2$ a 2 fold increase of childhood leukemia for children living near TV towers,125, significant differences in visual reaction time for male soldiers and reduced memory function[126] for exposures above 10 $\mu W/cm^2$, and biological efflux of calcium in vitro from nerve cells at 0.0006 W/kg and many confirming related amplitude modulated experiments[72].

19.2 2 $\mu W/cm^2$.should be considered if the Commission will not implement #19.1 option. Results to consider are those above, plus at 50 $\mu W/cm^2$ there was an 18% reduction of REM sleep[2], change in the immune system[6] at 100 $\mu W/cm^2$, at 100 $\mu W/cm^2$ a 26% drop in insulin, at 0.016 W/kg (about 120 $\mu W/cm^2$ for cellular frequencies) a pathological change in the blood-brain-barrier[128], at 30 $\mu W/cm^2$ an indication of damage to the blood brain barrier[59], at 0.08

W/kg there was stimulation of the production of ornithine decarboxylase critical for stimulating cell growth and division (so 1/100th of 0.08 W/kg at cellular frequencies is about 6 $\mu W/cm^2$, at 2.4 $\mu W/cm^2$ the electric field is 3 V/m and may cause interference with medical devices[76], at 4.2 $\mu W/cm^2$ there is perceptible, annoying interference to many hearing aids[77], at 1 $\mu W/cm^2$ is the level below which is "typical of public exposure" to personal wireless services[129], and so this is feasible for such services.

19.3 The Commission should implement above limits, but if it refuses then consider: Use SAR: 0.008 W/kg (approx 60 $\mu W/cm^2$ at cellular phone frequencies). A 1/10th reduction is strongly defensible. All of the above effects should be considered plus, behavioral disruption among IEEE final list papers occurred below 0.4 W/kg, at 0.4 W/kg was observed over a 3 fold increase in primary malignancies[111], at 0.6 W/kg was observed decreased learning of a maze[131] and increase in single strand DNA breaks[132], at 0.7 W/kg behavioral disruption after long term low level exposure[133].

20. Whatever exposure criteria the Commission selects, protection should be stated in §1.1310 and in informational material, and to include health agency evaluations and observed adverse effects below the hazard threshold upon which adopted criteria are based. Given the above and acknowledgment by the Commission of the need and benefit of induced and contact current measurements (R&O #147) the statements that the rules are sufficient to protect the public health (R&O #168,169) seem unwarranted.

21. **"occupational/controlled" definition implication may be misunderstood or overlooked:** The Commission may have overlooked or misunderstood that it is applying to persons in places of public transit, such as bus stops, being subject to a 5 fold higher limit. (1) The Commission may have overlooked that the NCRP 30 minute averaging time considered transient passage. (2) The Commission states it accepts the EPA recommendation to follow NCRP which explicitly addresses this concern but does not apply this definition. Hence, the Commission is acting contrary to its own policy. It is unrealistic to expect people, including unaccompanied children not to wait for a bus because there may be a transmitter nearby. NCRP should be followed for the public interest.

22 Some worker protections are vague concerning being *"fully aware of the potential for exposure and can exercise control over their exposure."*(in §1.1310 Table 1, Note 1). While it may be the Commission's jurisdiction does not encompass specific workplace rules and procedures, the Commission can issue guidance and provide a framework. Moreover, OSHA has stated that it evaluated the proposed exposure levels and finds the occupational/controlled levels not safe for workers and that it is a requirement for a safety program to be in effect to "mitigate any potential increase in risk."[37]. Accordingly, in a note in Table 1 of §1.1310 it should state, *"The exposure criteria for persons in an occupational/controlled setting only apply to persons when there is on file with the Commission a copy of the written RF protection program that appropriately addresses traditional safety and health program elements for such persons and including training, medical monitoring, protective procedures and engineering controls, signs, hazard assessments, employee involvement, and designated responsibilities for program implementation. Such a report description should accompany the application for a requested Commission action described in §1.1307(b) and should be prepared by those professionally prepared to assess the development, implementation, and maintenance of such programs when there are more than 10 employees which may be in such occupational/controlled environments. When workers are represented by organizations, such organization shall be invited and assisted to make its own assessment and to provide such information to the Commission at time of licensure, renewal, or other time, and the RF Safety program should describe how effective communication exists with such organizations representing workers. Moreover, authority is hereby given to federal, state, and local jurisdictions with responsibility for occupational health and safety to establish RF health and safety program criteria and monitoring deemed appropriate since Commission responsibilities do not encompass the issuance of specific rules on workplace practices and procedures.* If the Commission believes it does not even have the above authority, then it has no way of assuring the safety OSHA requires is met. Thus, it must either provide some means of being assured an appropriate program is in place, or to not allow the higher exposure.

23. Perhaps due to misunderstanding information in the record or other oversights, the Commission improperly did not adopt section 17.4.7 of the 1986 NCRP standard which provides for special worker protections when the carrier frequency is modulated between 5 and 100 Hz. As noted in this petition there are a number of studies that found modulated effects at low levels. Moreover, the Commission states it is not in a position to evaluate health issues and relies on the federal agencies. EPA not only recommended NCRP but explicitly addressed the modulation feature, and did not recommend it be deleted. Hence, the Commission is acting arbitrarily and capricious and not in the public interest by refusing to abide by the EPA recommendation, which will especially help protect workers. Hence, the Commission should put as a Note in Table 1 of §1.1310 that NCRP section 17.4.7 applies.

(9) Given all of the above effects, some at very low levels, and given continuing uncertainties, and that Commission limits will probably exceed the levels at which some significant biological effects occur, the Commission must adopt a policy of keeping exposures "as low as reasonably achievable." (ALARA). Given that the EPA has stated *"EPA has not conducted any study which concluded that there is a level at which there cannot be any non-thermal effects, nor are we aware of any peer reviewed study which reach that conclusion."* Also, a March bill in the State of Washington became law stating, *"exposures should be kept as low as reasonably achievable while still allowing the operation of these networks."* Likewise, the standard of the International Radiation Protection Association specifies, "In view of our limited knowledge on thresholds for all biological effects, unnecessary exposure should be minimized."[104] Accordingly, the Commission should add a Note 3 to Table 1 of §1.1310 which states, "The limits in this table are to be treated as maximally tolerable limits, and that in view of our limited knowledge on thresholds for all biological effects, exposures should be kept as low as reasonably achievable while still allowing the operation and establishment of personal wireless services networks. Accordingly, those issuing land use permits are authorized to use their authority to seek ways and direct the providing of permits to the end that exposures are kept as low as reasonably achievable. This authority may include denying a permit in cases where there is a clear and present feasible

alternative where for a reasonably moderate cost exposures may be significantly lowered, but may not be used to the effect of preventing the operating or establishment of such networks."

Footnotes to Petition for Reconsideration of the Commission R&O FCC96-326

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2. Klaus Mann and Joachim Roschke, "Effects of Pulsed High-Frequency Electromagnetic Fields on Human Sleep," Neuropsychobiology, 33, pp. 41-47, 1996.
3. J.P. Libet et al., "Electroencephalographic Changes Following Low Energy Emission Therapy," Annals of Biomedical Engineering, Vol. 24, pp 424-429, June 1966
4. M. Reite et al., "Sleep Inducing Effect of Low Energy Emission Therapy," Bioelectromagnetics 15:67-75
5. B. Pasche et al., "Effects of Low Energy Emission Therapy in Chronic Psychophysiological Insomnia," Sleep: 19(4):327-336, May 1996
6. E.Elekes et al. "Effect on the Immune System of Mice Exposed Chronically to 50 Hz Amplitude Modulated 2.45 GHz Microwaves, Bioelectromagnetics 17:246-248 (June, 1996)
7. J.Kirschvink, "Microwave Absorption by Magnetite: A Possible Mechanism for Coupling Nonthermal Levels of Radiation to Biological Systems," Bioelectromagnetics 167:187-194. (1996).
8. Microwave News March/April 1995, "Cellular Phone Notes, pg. 10.
9. "ATTENTION LA Cellular has been investigated by the California Public Utiliteis Commission," Los Angeles Times, April 16, 1995, page A14.
10. "Adey on NCRP Draft EMF Report," Microwave News, May/June 1996, pg 16
11. Biological Effects of Nonionizing Electromagnetic Radiation (BENER) Digest item #2263, reprinted in Biological Effects of Electropollution, ed. S.Dutta and R. Millis, published by Information Ventures, Inc. Philadelphia, 1986, pg. 188-189
12. "Biological Effects of Microwave Radiation," Microwave News September/October 1993, pg 12.
13. April 1991 note of Dr. Mays Swicord, Food and Drug Administration Center For Device and Radiological Health and member of the balloting committee for IEEE C95.1-1991, which he attaches to his ballot and in which explains why he voted against this standard, plus April 1991 note of Dr. M. Altman (of FDA) concurring with Dr. Swicord.
14. B. Veyret et al., "Antibody responses of mice exposed to low-power microwaves under pulse- and amplitude modulation," Bioelectromagnetics 12:47-56.
15. Federal Communication Commission OST Bulletin No.65, 1985
16. Federal Communication Commission Report and Order FCC 96-326, footnote 41
17. Federal Communication Commission Report and Order FCC 96-326, page 12, 13
18. California Public Utilities Commission Decision I-92-01-002, filed January 10,1992.
19. IEEE ballot committee SCC-28 results on project C95.1, dated May 14, 1991.
20. Environmental Protection Agency letter from Margo Oge dated November 9, 1993 to the Federal Communications Commisson regarding ET Docket 93-62
21. Federal Communication Commission Report and Order FCC 96-326, paragraph #40
22. "Revising ANSI RF/MW Limits: Debate Often Contentious", Microwave News September/October 1989
23. Seattle Times, July 19, 1996, "Cellular towers go undercover," by Associated Press, Section D page 1.